





## Heat Related Injuries



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#### Heat Stress In The Work Environment

One of the most overlooked hazards that can be encountered in the workplace is heat. Heat stress is often considered a seasonal problem, associated with employees working outside in the hot summer sun. However, it can be found throughout the workplace at any time of year. The need for employees and supervisors to be aware and prepared for hot and sticky situations becomes a workplace priority. Heat stress is a serious problem that can affect all varieties of employees on the job. It is not only dangerous to the employee's health, but to the fellow employees as well because the victim may be unable to perform job duties in a safe manner.

#### What is Heat Stress?

Heat stress is defined as a condition in which the total net heat load on your body from internal heat production and external sources exceeds your body's capacity to cool itself. Heat strain is the term used to describe the physiological response to heat stress. There are several factors that may reduce one's tolerance to heat stress, such as chronic illnesses, obesity, alcohol use, drug use, and temporary illnesses such as the flu. Although tolerance to heat stress will vary from person to person, heat strain will generally decrease an employee's judgment and workmanship. When an employee is subjected to sustained levels of heat stress, the real problems begin. The potential for accidents and the likelihood of the employee sustaining heat-related illnesses increase.

#### Sources of Heat Stress

**Air Temperature:** The higher the surrounding air temperature, the more heat stress occurs.

**Air Movement:** When the surrounding air temperature is below your body temperature, increased air flow can be a great way to avoid heat stress. However, when the surrounding air temperature is above your body temperature, increased airflow transfers more heat to your body!

**Humidity:** Humidity determines the rate at which sweat evaporates from your skin and cools your body. High levels of humidity can severely reduce your body's capacity to cool itself.

**Radiant Heat:** The sun, hot asphalt, steam pipes, radiators, and ovens produce radiant heat. The greater the source of radiant heat, the greater the potential of heat-related illnesses.

**Metabolic Heat:** It is produced by your body in relation to the work that you are doing. The more strenuous the work, the more heat your body produces and the harder it must work to eliminate it.

#### Symptoms

As you move, your body heats up. Perspiring is one way your body cools off. Your body also directs more of your blood to your skin, which is why you may look flushed when you're hot. When your body overheats, it begins to try to cool off. While your body is trying to cool itself off, other jobs your body must do may not get done.

Generally, symptoms start out mild, but grow serious if left unmonitored and untreated. Early symptoms include reduced mental and physical performance. Heat rash can result from sweaty skin. Painful muscle spasms and heat cramps often result from excessive loss of fluids and electrolytes (if they are not replaced).

More severe cases of heat strain can result in heat-induced fainting or loss of consciousness. Dehydration and circulatory strain from diverted blood flow can lead to heat exhaustion. Dizziness, headaches, nausea, general confusion, and a loss of strength are serious signs of heat exhaustion and should be given immediate attention.

Ignoring these warning signs can lead to heat stroke. When heat stroke occurs, the body loses its capacity to cool itself and completely shuts down. You may lose consciousness and may suffer convulsions. Your body temperature is far above normal, there is no sweat, and your skin becomes very hot and dry. Permanent damage or death may result if left untreated.

#### **First Aid**

If a victim gets heat cramps, pains, or spasms, they are most often in the arms, legs, or abdomen. (You can also get heat cramps from drinking too many cold drinks or by drinking them too quickly). The victim will also be perspiring heavily. Massage or use firm pressure on the muscle that is cramping. Small sips of water will help cool the victim's body. Move the victim into the shade or a cooler (not cold) place.

Victims suffering from heat exhaustion will have some or all of the following symptoms: sweaty, clammy, flushed, or pale skin, dizziness, weakness, nausea, rapid and shallow breathing, headache, vomiting, or fainting. Lay them down in a cooler (not cold) place, with feet raised and tight clothing loosened. Give them sips of cool water. Call emergency medical personnel, especially if there is vomiting or fainting.

Heat stroke means the body has gone into crisis. Call emergency medical personnel immediately. If the person has stopped breathing, administer CPR. Move the victim to a cooler area and, if possible, soak the person in a cool bath. Use a fan or cold packs if available. Keep the victim lying down with feet raised.

#### **Prevention is the Key**

Rather than respond to a medical emergency, your first objective should be to locate and evaluate all jobs that may result in excess heat stress to employees. The second objective is to minimize the risks of heat disorders or illnesses among employees exposed to hot conditions.

#### **Acclimatization**

It takes about 4-7 days to get used to unusual heat. Over this time, your body learns to adapt, sweating more, conserving body salt, and reducing cardiovascular stress. Work schedules should take this acclimatization into consideration.

#### **Education**

Perhaps one of the best ways to prevent heat stress in the workplace is through education. It is important for all employees to understand the dangers of heat stress, how to recognize the early symptoms, how to treat problems from occurring in the first place. Once employees have a good understanding of heat stress, their judgments about their own conditions play an important role in providing for their safety.

#### **Monitoring**

Supervisors should monitor both the workplace environment and the individual employee for susceptibility to heat stress. There are some instances when monitoring the individual rather than the environment may be more appropriate to ensure employee safety. (For example, an employee wearing protective clothing may suffer heat stress in a relatively cool environment).

#### **Fluid Replacement**

To combat your body's loss of water and body salt during heat stress, you need to frequently replace the lost fluids by drinking water or electrolyte-enriched drinks. (You may not be thirsty, but your body can still be losing as much as three gallons of water a day in hot weather).

Take in fluids on a regular basis by schedule rather than by waiting for thirst. Often by the time you are thirsty you are already beginning to experience some of the early symptoms. Beverages such as soft drinks, coffee (caffeine), tea, or alcohol contribute to dehydration and should not be used to replace lost fluids.

**Proper Clothing**

When working outside or in high heat atmospheres, the proper clothing is also important. Clean, loose-fitting, light clothing that allows airflow should be worn in hot humid conditions. Some situations in which protective clothing (such as body suits) must be worn can increase your heat load. Special precautions and training may be required in these instances.

**Work Schedule**

Take frequent breaks in a cool place. Adopt a work/rest schedule or schedule high exposure tasks during the coolest time of the day (or even delay them until cooler weather).

**Engineering Controls**

Engineering controls can be simple and inexpensive, and may even enhance productivity by reducing stress.

**Ventilation Fans:** Increase air movement that aids in sweat evaporation for cooling purposes. This can be very effective provided the air temperature is below body temperature.

**Air Conditioning:** Although not always practical, it will greatly reduce heat stress by cooling the air and reducing the humidity.

**Radiant Heat Shields:** Provide relief by blocking the source from the employee. They can range from hats or tents that provide shade from outdoor sun, to heat reflecting curtains that provide a barrier from ovens and steam pipes.

**Work Load Change:** Reducing the workload and metabolic rate of the employee will also reduce their potential for heat-related illnesses. Using power assisted tools and machinery or changing the work methods will accomplish this also.

**Protective Equipment:** Some jobs require that employees perform under extreme conditions where exposure to very high heat loads can't be avoided. Personal protective equipment may be the best or only solution for safety in those situations. Some examples of protective equipment are heat reflective clothing, ice vests which conduct heat from the skin, circulating air systems that enhance evaporation and convective cooling when using cool dry air, and liquid cooling systems which remove body heat through conduction.

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# Standards for Adult Correctional Institutions 4<sup>th</sup> Edition



Part 2: Physical Plant

## Dayrooms

4-4149

(Ref. 3-4142)

Each dayroom provides a minimum of 12 square feet of transparent glazing with a view to the outside, plus two additional square feet of glazing per inmate whose room/cell does not contain an opening or window with a view to the outside. (New Construction Only)

*Comment:* Many inmates spend most daylight hours outside of their cells, often in their dayroom, and the standard gives designers increased options for providing natural light.

## Noise Levels

4-4150

(Ref. 3-4143)

Noise levels in inmate housing units do not exceed 70 dBA (A Scale) in daytime and 45 dBA (A Scale) at night.

*Comment:* None.

## Indoor Air Quality

4-4151

(Ref. 3-4144)

Circulation is at least 15 cubic feet of outside or recirculated filtered air per minute per occupant for cells/rooms, officer stations, and dining areas, as documented by an independent, qualified source. (Renovation, Addition, New Construction Only)

*Comment:* Mechanical ventilation may provide for recirculation of outside air except where prohibited by codes. The outside air requirements may be reduced to a minimum of 33 percent of the specified ventilated air quantity if adequate temperature control is provided in addition to filtering equipment so that the maximum concentration of particles entering the space is reduced to acceptable limits. In no case should the outdoor air quantity be less than five cubic feet per minute per person.

4-4152

(Ref. 3-4145)

Circulation is at least ten cubic feet of fresh or recirculated filtered air per minute per occupant for inmate rooms/cells, officer stations, and dining areas, as documented by an independent, qualified source. (Existing)

*Comment:* None.

## Heating and Cooling

4-4153

(Ref. 3-4146)

✱ Temperatures in indoor living and work areas are appropriate to the summer and winter comfort zones.

*Comment:* Temperature and humidity should be capable of being mechanically raised or lowered to an acceptable comfort level.